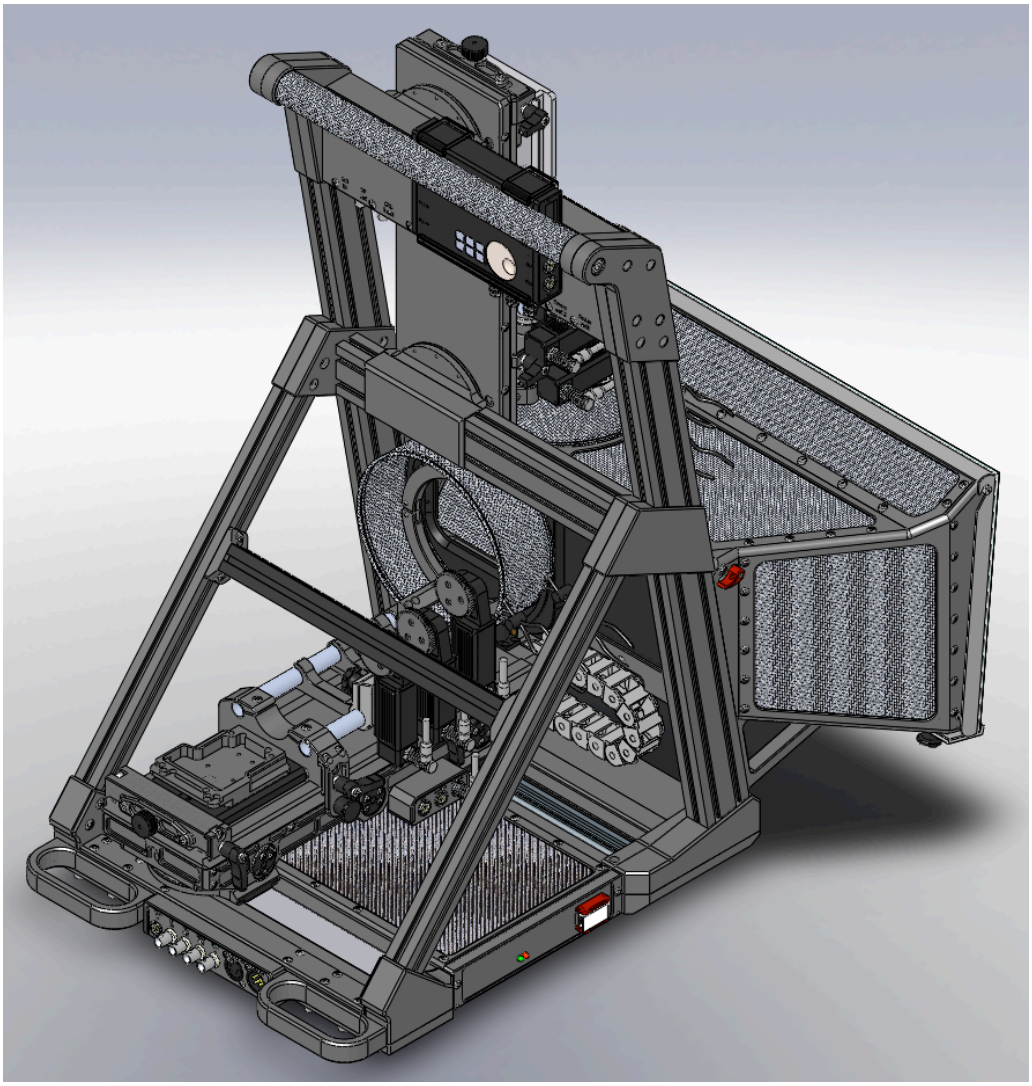
3FLEX™ TS-2-Studio

Beam Splitter
Stereo Camera Platform

User Manual

V1.5.0



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Intended Readers

Users, Operators

Subject

How to setup the TS-2-Studio

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Preface

This document contains instruction and reference information for the operation and use of the

3FLEX™ TS-2-Studio Beamsplitter Stereo Camera Platform

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- Customer Support will be provided only for products under warranty or those covered under a valid Support Agreement.
- Before returning the Product for repair, it is necessary to obtain a Return Merchandise Authorization (RMA) number by calling (818) 333-3000. You will be asked to provide the system's serial number.
- The non-functioning part should be properly packed and shipped pre-paid to 3ality Technica with the RMA number clearly displayed on the outside of the package and on the accompanying RMA form. We will refuse to accept any package without a valid RMA number.
- Repairs outside the scope of the Limited Warranty require a valid and valid Support Agreement prior to any repairs. 3ality Technica does not offer time and materials based repair services.

2 Introduction

3ality Technica's 3FLEX™ TS-2-Studio restores creativity to the filmmaker. Designed by cinematographers and engineers, this fully motorized beamsplitter stereoscopic platform accommodates a variety of cameras and lenses. Whether you are shooting a feature film, sporting event or wild gazelles on the veld, the TS-2 is your answer to quick and accurate setups, freeing you to shoot 3D on a 2D schedule. 3ality Technica's calibration software is sophisticated, powerful and easy to navigate, providing you with matching zooms and smooth tracking for every shot. In addition, 3ality Technica's proprietary software captures positional metadata every six milliseconds. You can use the metadata to integrate actual camera data into your computer generated environments seamlessly. Whatever you can imagine, 3ality Technica makes it possible.

2.1 Beamsplitter

In contrast to classical side-by-side stereo camera rigs, the 3FLEX™ TS-2-Studio Platform utilizes a beamsplitter to allow for narrow Inter-Axials. This beamsplitter is sometimes also called mirror. In classical side-by-side stereo camera rigs, the minimum Inter-Axial is limited by the width of the camera or the diameter of the lens.

With beamsplitter configurations, one camera looks through the beamsplitter while the light rays for the other camera are reflected. For the TS-2-Studio, the right-eye camera it the "through"-camera, while the left camera is the "reflected"-camera.

Of course, the image of the reflected camera will be mirrored. Therefore the video-data from this reflected camera must be corrected to compensate for this mirroring. This operation can be either performed in a realtime-solution, such as the 3FLEX™ SIP Stereo Image Processors, or in the postproduction workflow.

2.2 Height/Pitch-Unit

A unique feature of all 3FLEX™ stereoscopic camera platforms from 3ality Technica, including the TS-2-studio, is the height/pitch-unit under the right camera, which enables the calibration software-system to compensate for vertical misalignments, which are usually mainly caused by the operation of zoom-lenses.

2.3 Typical In-System Configuration

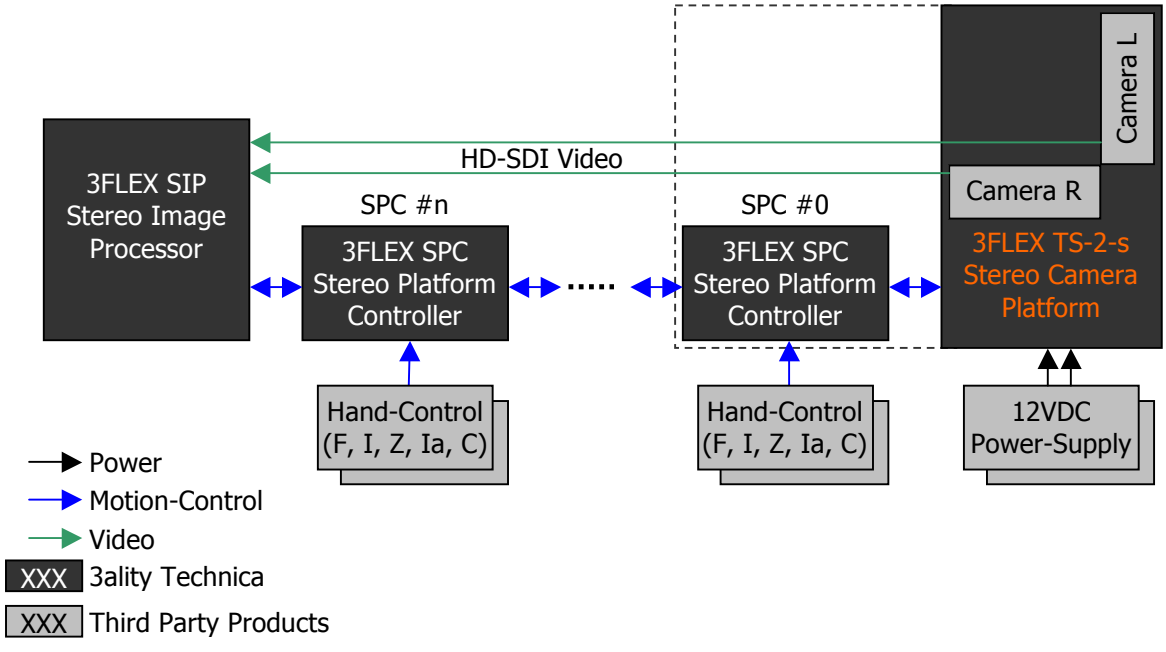


Figure 1. Typical In-System Configuration

2.4 Rig Overview

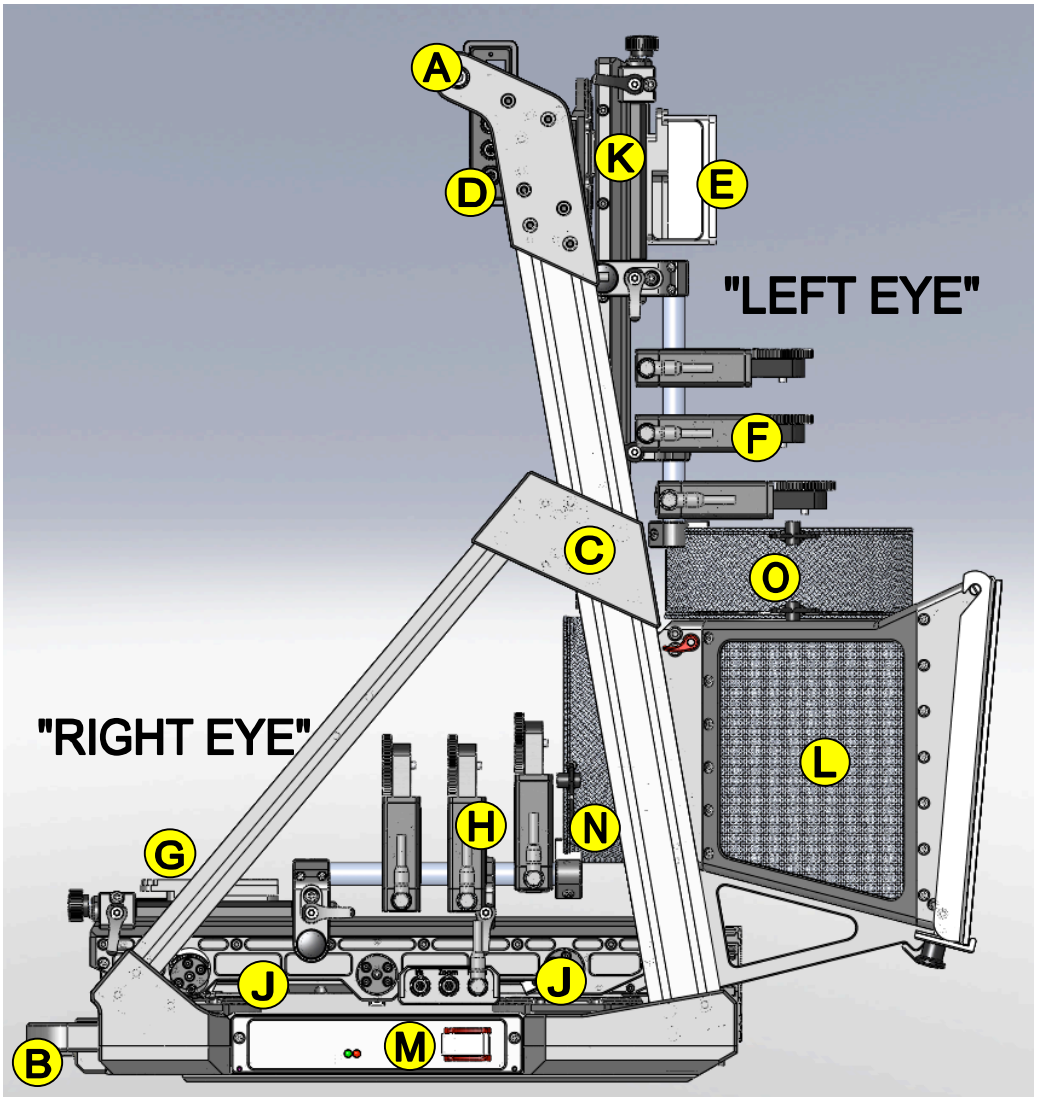


Figure 2. Right-hand side view. No cameras and no lenses mounted.

No.	Description	Comment
A	Top Handle	
B	Base plate handles	
C	Aluminum frame	
D	SPC box	Stereoscopic Platform Controller. Contains triangulöation math and motion intelligence; The SPC box is not necessarily included with the rig and therefore only shown in the drawings as sample.
E	Left-eye camera mount	
F	Three left-eye lens motors	
G	Right-eye camera mount	shown without camera adaptor
H	Three right-eye lens motors	
J	Height/pitch unit	with camera/lens sled
K	Convergence unit	with camera/lens sled
L	Mirror unit	
M	MRCU board with power switch	Contains motor drivers and controls
N	Right-eye sock	with lens support bracket inside
O	Left-eye sock	with lens support bracket inside

2.5 Base connectors

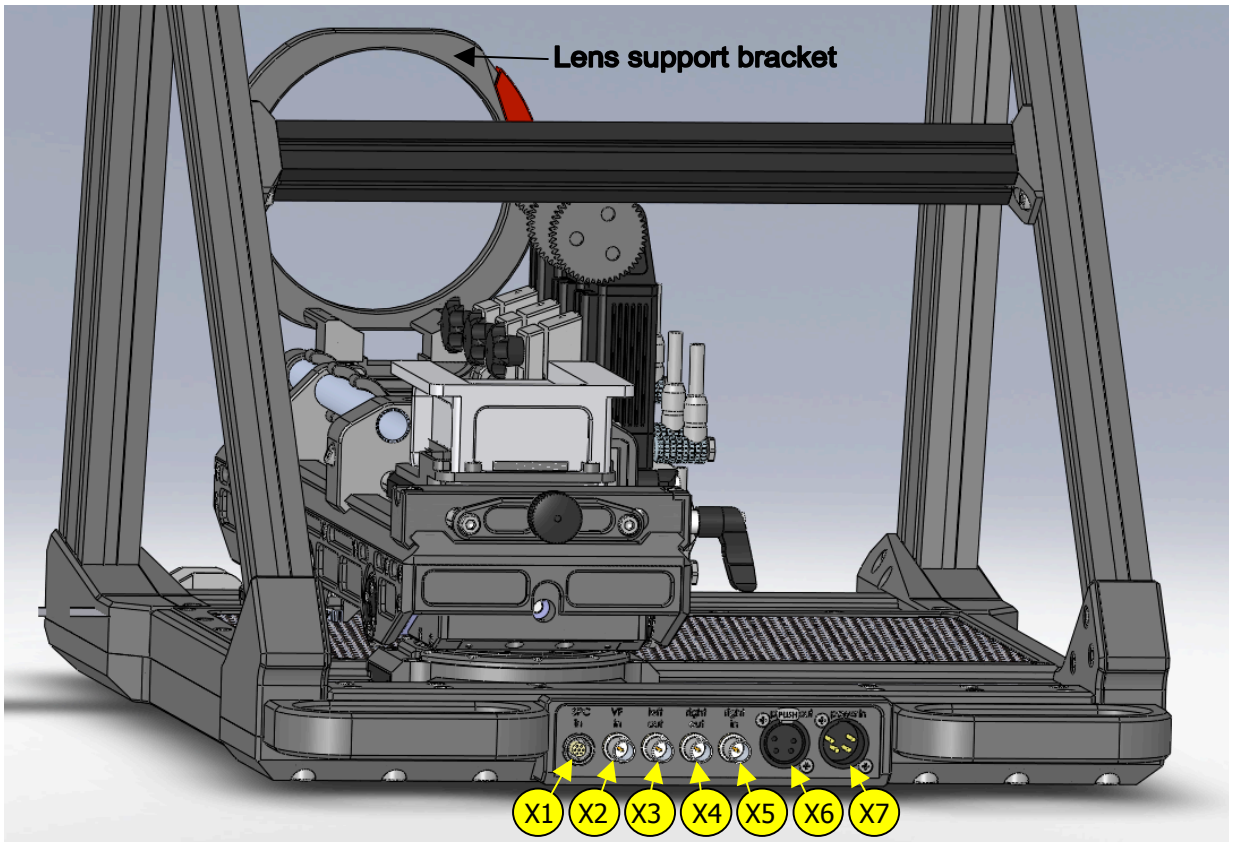


Figure 3. Rear view

No.	Description	Comment
X1	SPC in	Lemo10. Internally wired to "SPC remote" at top unit
X2	VF in	BNC Viewfinder input
X3	Left out	BNC Video from left-eye camera
X4	Right out	BNC Video from right-eye camera
X5	Right in	BNC Right-eye camera video connects here
X6	Power out	XLR4 female
X7	Power in	XLR4 male. Input from power supply

Note: All "power out" jacks stay on when the MRCU power switch is turned off! Disconnect the "power in" connector for a safe off-state.

2.6 Height/Pitch unit connectors

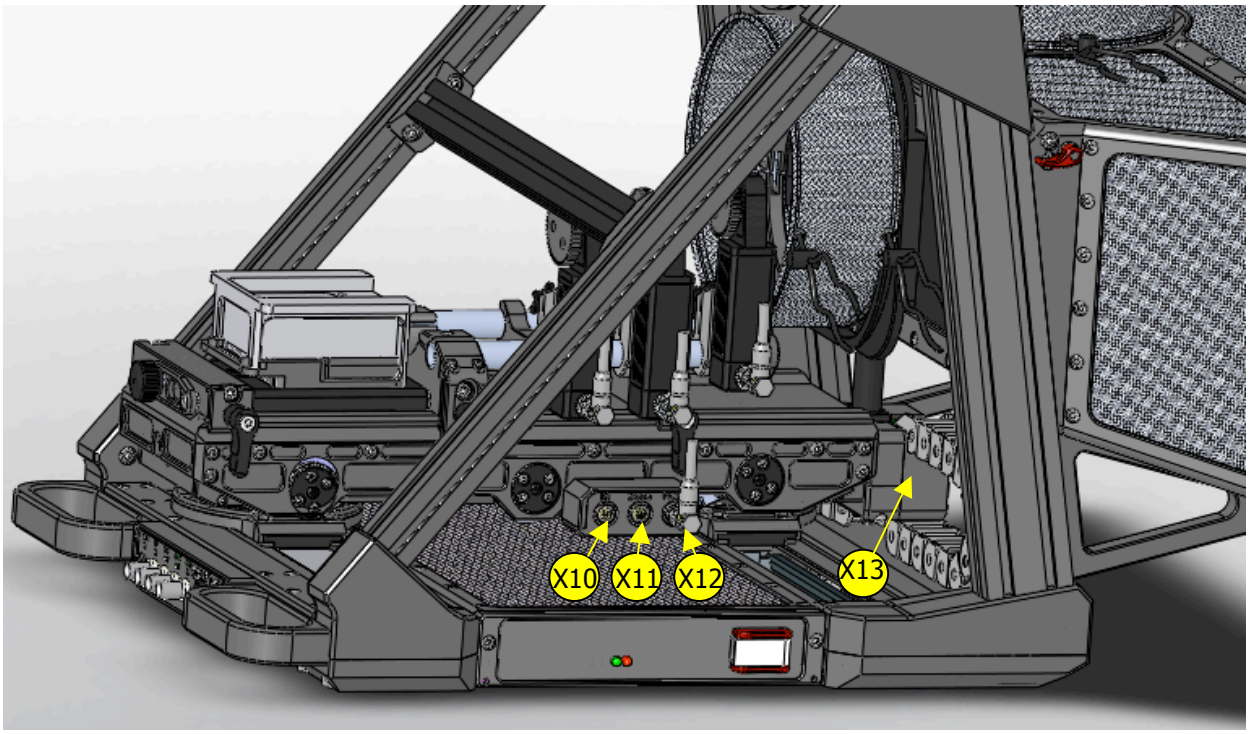


Figure 4. Height/Pitch unit

No.	Description	Comment
X10	Right Iris motor supply	Lemo7 receptacle
X11	Right Zoom motor supply	Lemo7 receptacle
X12	Right Focus motor supply	Lemo7 receptacle
X13	Drag Chain connector	Not to be disconnected by user

Note: The motor order on the lens rods is usually the same as the connectors order at the H/P unit.

2.7 Top unit connectors

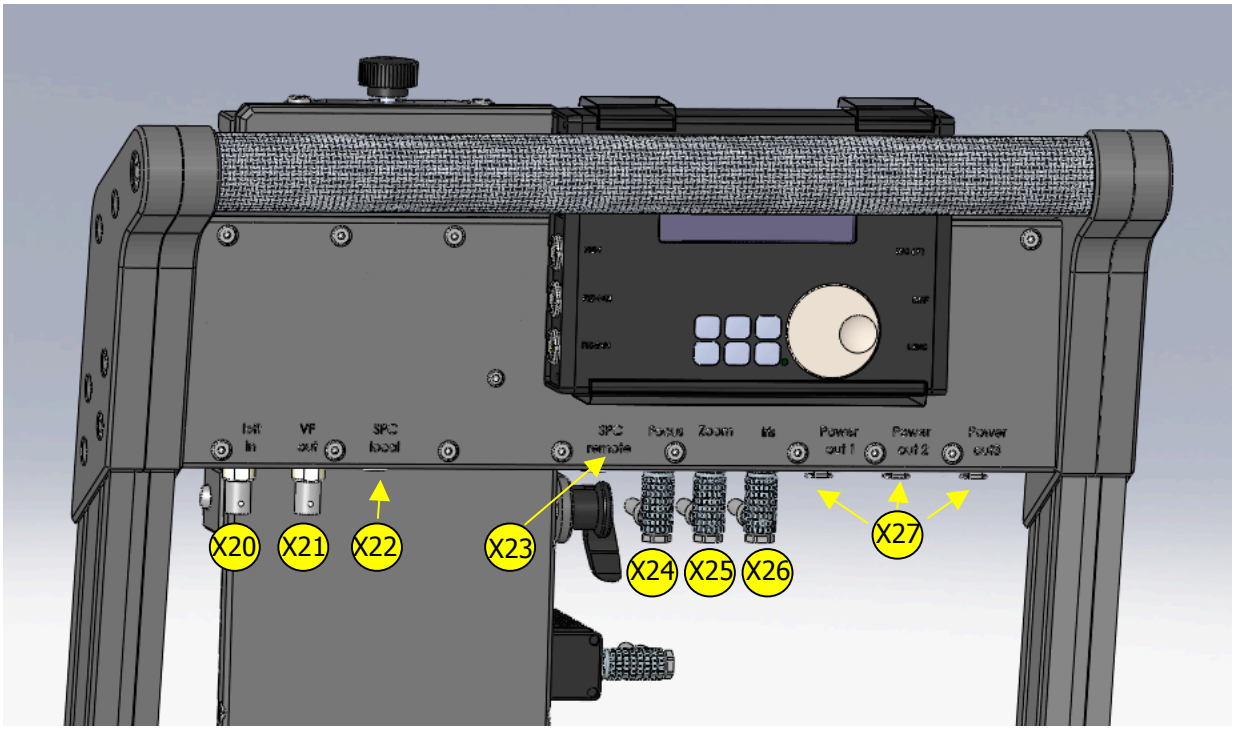


Figure 5. Top unit connectors

No.	Description	Comment
X20	Left in	BNC. Left-eye camera video connects here
X21	VF out	BNC. Internally wired to "VF in" at base
X22	SPC local	Lemo10. Connects SPC box to MRCU board
X23	SPC remote	Lemo10. Internally wired to "SPC in" at base
X24	Left Focus motor supply	Lemo7 receptacle (shown with plug inserted)
X25	Left Zoom motor supply	Lemo7 receptacle (shown with plug inserted)
X26	Left Iris motor supply	Lemo7 receptacle (shown with plug inserted)
X27	Three power outputs	XLR4 female. Left-eye cam and viewfinder

2.8 Internal Harnesses

To ease installation and cabling, internal harnesses have been built into the TS-2-Studio.

2.8.1 Power

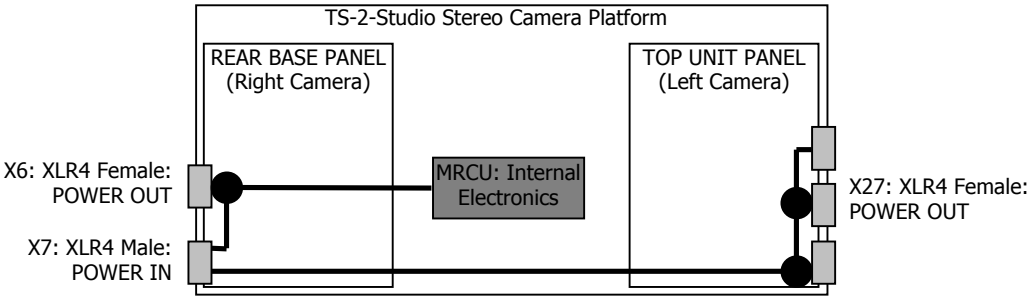


Figure 6. Internal Power Harness

2.8.2 Video

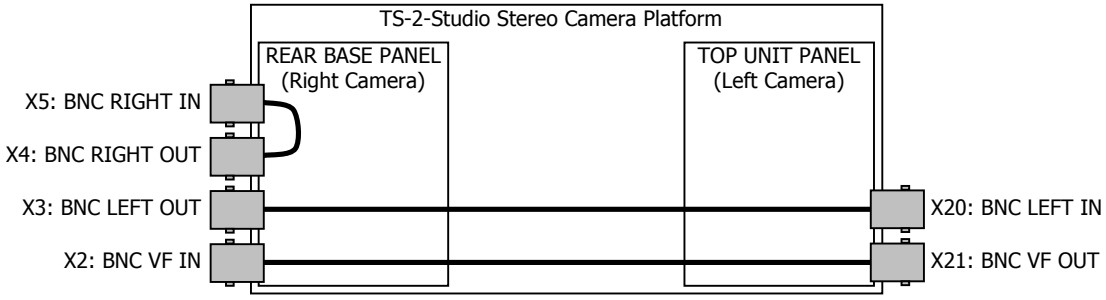


Figure 7. Internal Video Harness

2.8.3 Control

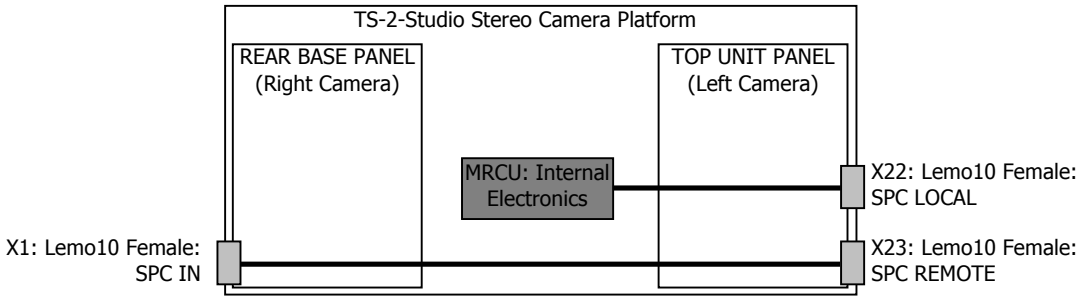


Figure 8. Internal Control Harness

3 Before you start

3.1 Safety

3.1.1 General Safety Instructions

1. Operating the camera platform may be done by qualified personnel only.
2. Read these instructions.
3. Keep these instructions.
4. Heed all warnings.
5. Follow all instructions.
6. Do not use this apparatus near water.
7. Clean only with dry cloth.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
10. Only use attachments/accessories specified by the manufacturer.
11. Unplug this apparatus during lightning storms or when unused for long periods of time.
12. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply, its cord or its plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

3.1.2 Specific Safety Instructions

1. The TS-2-studio camera platform is designed to be used indoors only. In case of outdoor usage, make sure that it is not exposed to moisture or rain. Use appropriate covers in case of moist or wet weather-conditions!
2. In order to prevent overheating, make sure that the device is properly vented, especially when used under protective covers!
3. Use only certified power-supplies with an internal current-limiter (fuse or trip-switch). Set this limiter to 6 Ampere max. Make sure that the voltage of your power-supply has a nominal voltage of 12VDC with a tolerance of not more than -10% / +25% (10.8-15VDC)!
4. Ensure that the TS-2-Studio is always firmly standing on a table or safely mounted on a tripod, fluid-head, remote-heat, etc. with sufficient load capacity!
5. Beware of the fact that the beamsplitter is made of glass and is therefore very fragile and delicate. Handle with extreme care and avoid cutting yourself with glass-splinters, in case of a damaged beamsplitter!
6. Make sure, that your connector of the power-supply "power in" (female 4pin XLR) is always easily accessible!
7. Disconnect this "power in" connector before any assembly or service work!

Be highly attentive when reaching into the camera platform while in use, to prevent injuries from (unpredictable) movement.

Do not grab under the Height/Pitch Unit at any time.

See picture below for motorized movement areas.

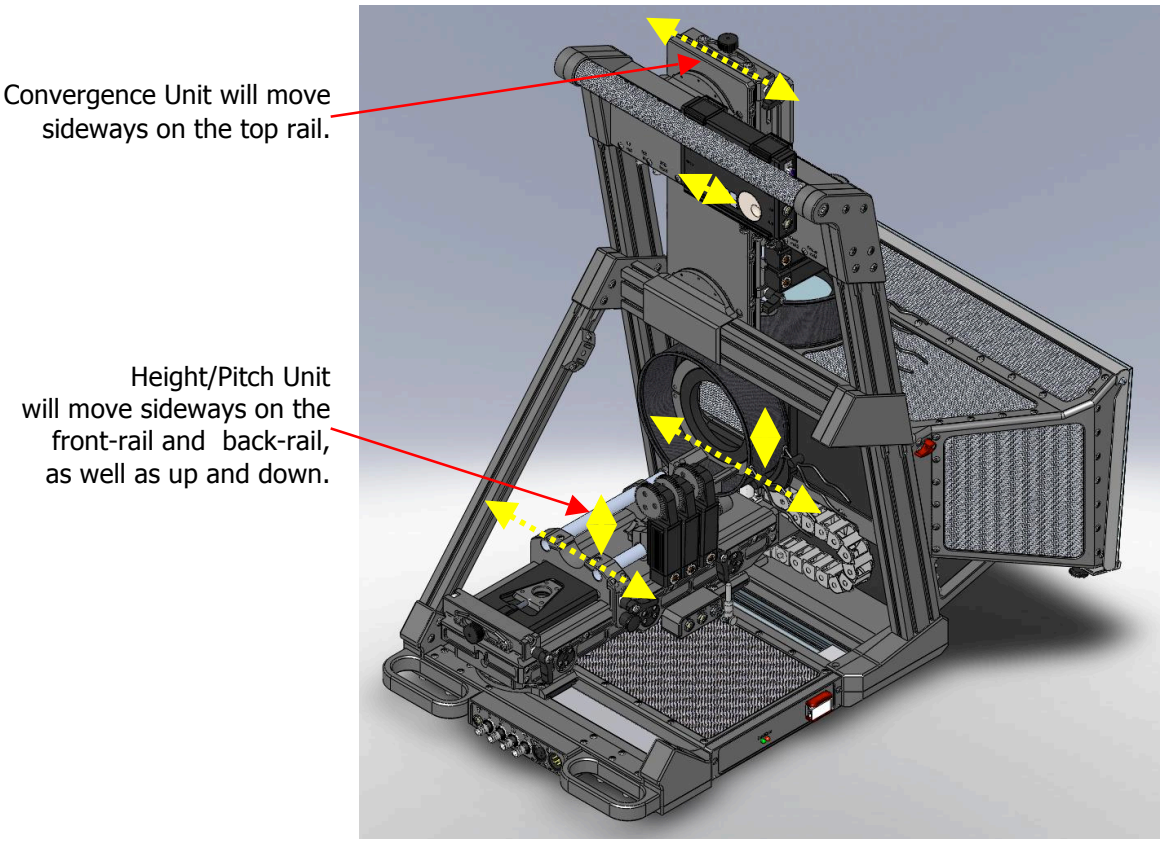


Figure 9. Moving Parts (Parts of the frame removed in this picture)

3.1.3 Safety Measures

The two parts highlighted in red in the following picture prevent from injuries on fingers and hands from Convergence Unit movement and may not be removed.

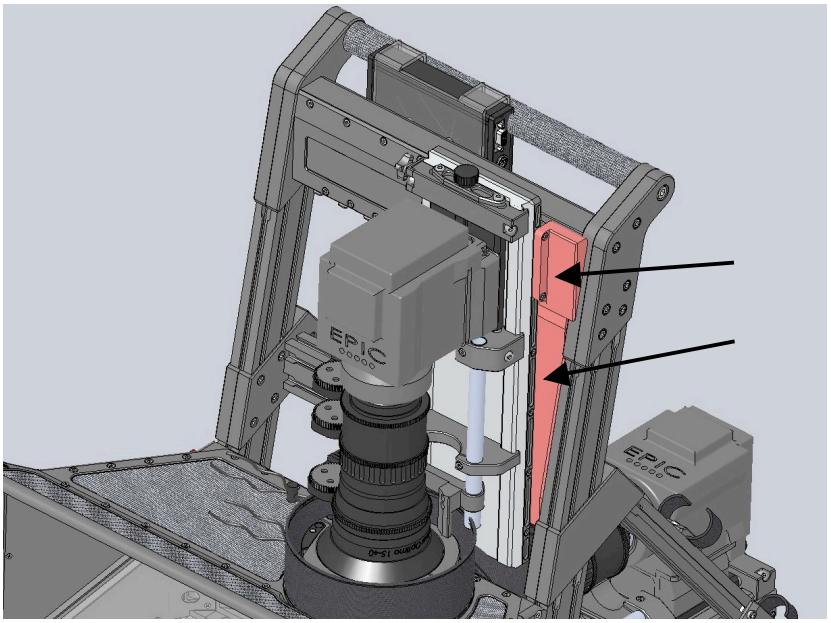


Figure 10. Safety Measures on Convergence Unit

The parts highlighted in yellow in the following picture prevent from injuries on fingers and hands from movement of the Height/Pitch Unit and should not be removed.

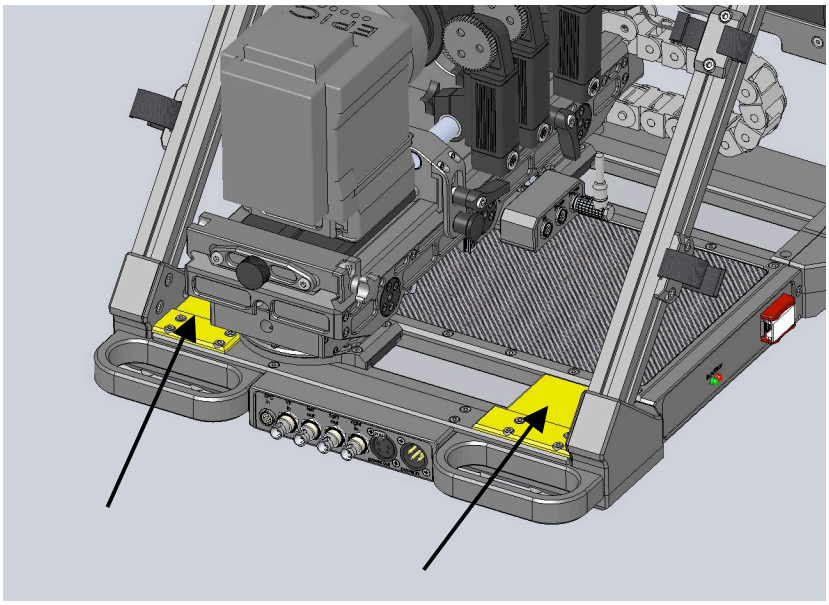


Figure 11. Safety Measures on Right-Eye Camera

Removal of any safety-measures is on the users´ own risk. 3ality Technica can not be held responsible for any injuries caused by disregard of safety-instructions or removal of safety-measures.

3.2 Parts needed

Necessary part amounts are printed bold; Part names are underlined.

Pos	Quantity	Description
1.	**1**	3flex TS2 Studio 3D Camera Platform
2.	**2**	3flex TS2 Studio 3D Camera Platform Lens cover socks
3.	**2**	3flex TS2 Studio 3D Camera Platform Camera/Lens Sleds One Camera/Lens Sled consists of • a lens support bracket, • **2** – 15mm iris rods, • an iris rod support bracket, • a camera support, • **3** – Heden lens motors, • **3** – Heden lens motor mounts for 15mm iris rods.
4.	**2**	Cameras or Camera T-Head optical blocks
5.	**2**	Camera mount adaptors appropriate to camera type
6.	**2**	matching zoom lenses with donut spacers if necessary to fit lens into lens bracket
7.	**6**	Heden lens motor interface cables (7pin Male Lemo)
8.	**1**	SPC motor control interface box
9.	**1**	SPC motor control interface box cable. (10pin Male Lemo)
10.	**1**	12 volt "Y" power cable. (4pin Female XLR to 2 – 4pin Male XLR

Attention! "blue" part label numbers in this chapter are not consistent with the "yellow" labels in other chapters or in the service manual!

4 Preparing the Stereo Camera Platform

4.1 Camera/Lens sled assembly

Attention! Numbers in brackets refer to blue part labels. These numbers are not necessarily consistent with the "yellow" labels in other chapters or in the service manual!

1. Disconnect platform power. Attach camera adaptor mounts (#2) to cameras (#1) with appropriate hardware. (Dove tail pointing toward lens). Mounts may look different for other camera models.

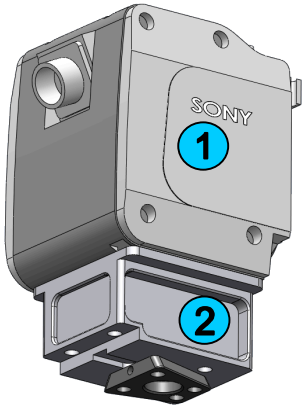


Figure 12. Camera on Camera adaptor mount with dove tail base

2. Attach camera to camera support (#3) fitting dove tails together.

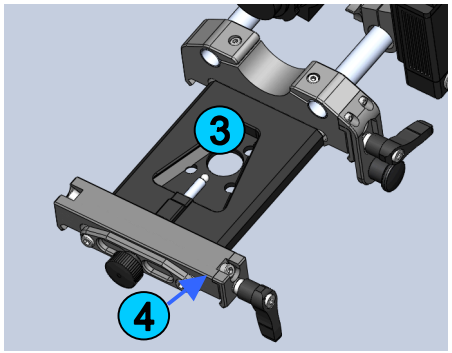


Figure 13. Camera support with dove tail cut-out

3. Tighten lock, using the black knob (#4) at the rear of the camera support until firm. (HAND TIGHTEN ONLY!)

4. Open lens support bracket (#5) by releasing lens bracket latch (#6) and swinging top half of bracket open.

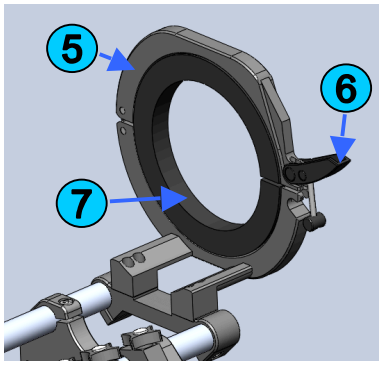


Figure 14. Lens support bracket with donut spacer

5. All Heden lens motors (#8) should be in an upright position to start. Make sure that the pitches of the snap-on-gears on the Heden lens motors match with the pitch on the gears of the lans-barrels on your lens.

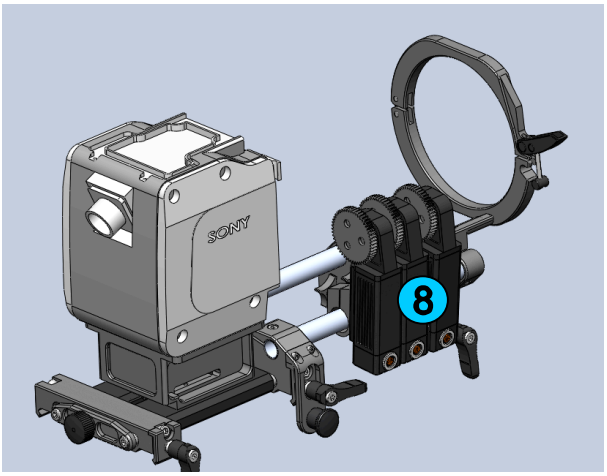


Figure 15. Heden Lens Motors

6. Test fit lens to camera.

   Note: where motor gears and brackets should line up for good contact and good support. (If the space between the lens gears is too close to align the motors, motor gears can be attached at the other side of the motor. You can also move a whole motor to the other side lens rod).

7. Adjust all brackets and motors accordingly.

8. Remove Lens caps.

9. Remove camera lens port cap.

10. Attach lens to camera lens port.

11. Loosen lens support bracket screws (#9).

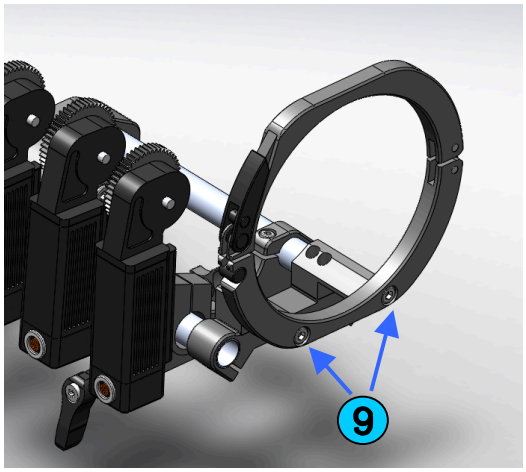


Figure 16. Lens support bracket screws

12. Fit the lens end into the lens support bracket. If needed, use lens spacer donut (#7) around end of lens, filling the space between lens and bracket.

13. Close top of lens support bracket, insert ball into slot and close lock (#6) until snaps shut.

14. Re-tighten the lens support bracket screws (#9).

15. Mate lens motor gears to lens gears and lock motors in place with knobs (#10) on lens motor brackets.

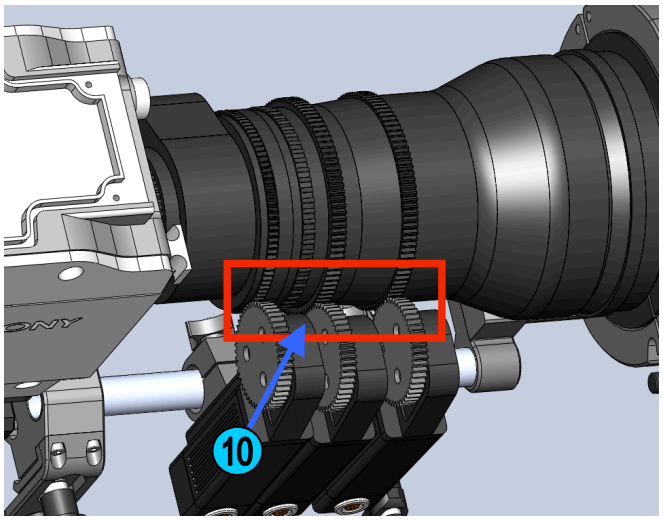


Figure 17. Mating gears

16. Camera/Lens Sled is now assembled.

Repeat step 1 to 16 for second Camera/Lens Sled.

4.2 Anti-Backlash Motor Bracket Mounting

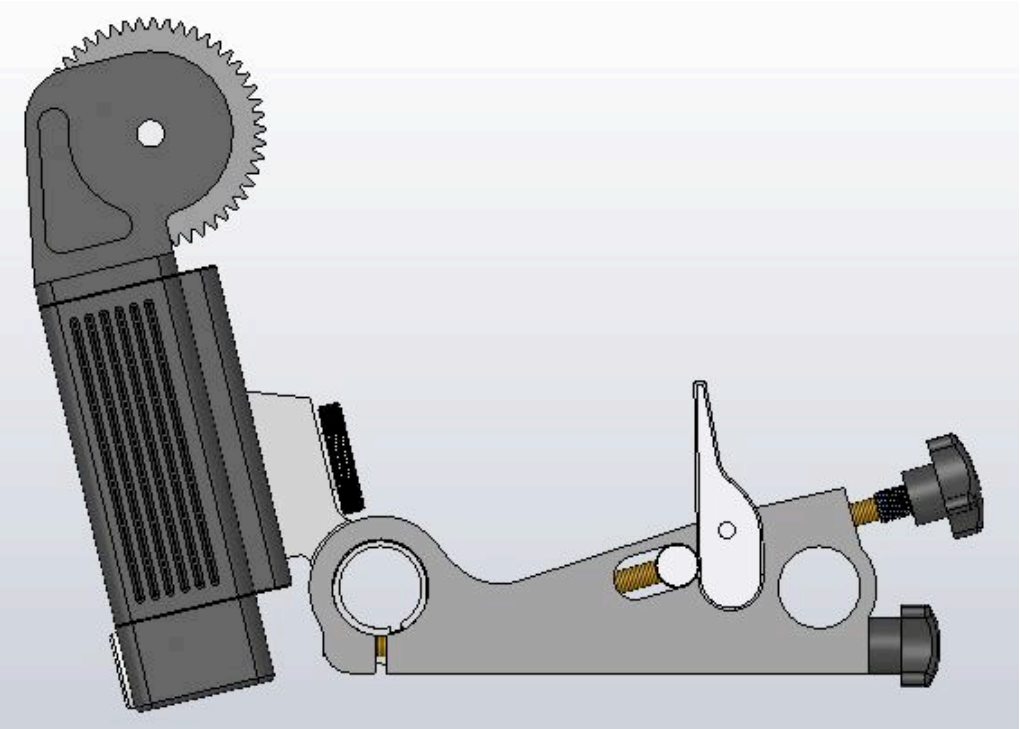


Figure 18. Anti-Backlash Motor Bracket

This is a specific instruction set for those users of the TS-2-Studio, which have procured the optionally available Anti-Backlash Motor Brackets (ABB).

The ABB was developed to fill the need of extreme accuracy of lens motor position during a shoot in 3D. 3D requires that lens motor position in relation to lens gear engagement does not change once all LUTs (Look Up Tables) have been loaded. Once set, the position and changing backlash associated with long duration shooting should remain constant or unchanging during an event until the motor is manually loosened or otherwise deliberately moved by the user.

There is a quick release feature that allows the quick, gross movement of the lens motor in or out of position for lens changes etc. And more valuably, there is a fine adjustment to precisely engage the lens motor gear to the lens gear. Finally there is a lock screw that secures the position of the ABB to the iris rod and the ABB lens motor position.

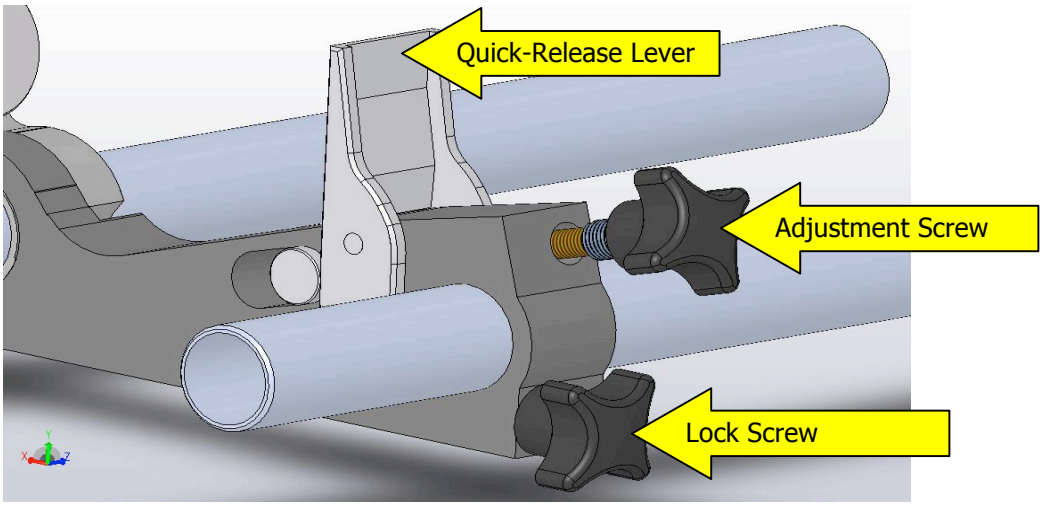


Figure 19. Controls of the ABB

1. Loosen the ABB threaded nut lens motor clamp.
2. Slide the lens motor onto the ABB motor receiver and using the threaded nut, lock the lens motor in the vertical position you desire for good lens gear contact. This may be easier said than done due to limited space restrictions, so do your best.
3. Make sure the lower lock screw is loosened and position the lens motor bracket as you would any other in order to achieve alignment of the lens motor to the lens gear.
4. Cannot clear the lens with the lens motor?
   a. Option 1, back off the upper screw knob and pull lens motor away from the lens. Continue this procedure until the clearance you desire has been achieved.
   b. Option 2, open the quick release lever and pull back the lens motor a large amount.

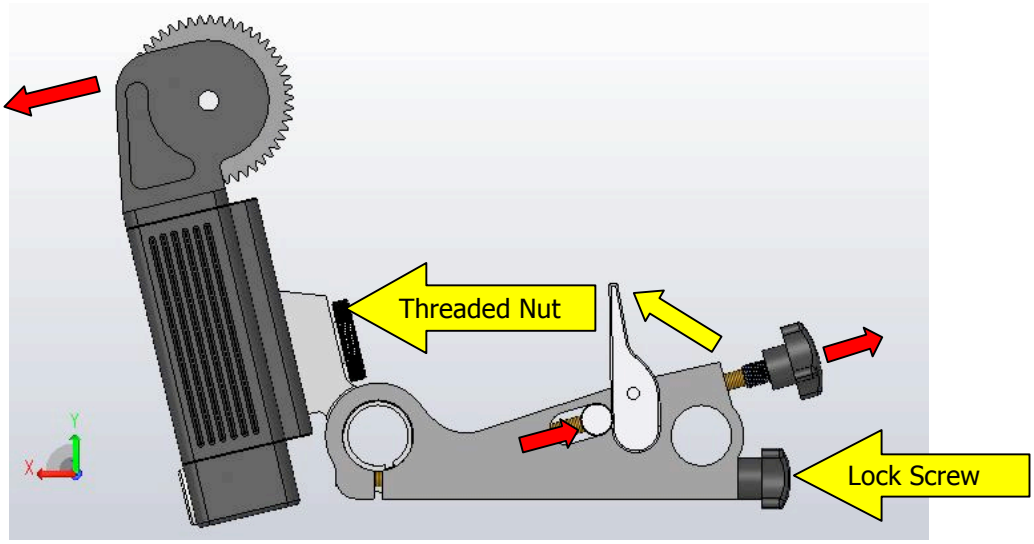


Figure 20. ABB in Open Position

Note: A new ABB can be very stiff. If so, you may need to loosen the ABB lower lock screw and or open the upper adjustment screw a slight amount to relieve pressure on the lever before you can release the quick release lever.

5. With the lens motor gear aligned with the lens gear which you wish to engage, make sure that your quick release lever is closed, and start to turn your upper adjustment screw to move the lens motor gear toward the lens gear.

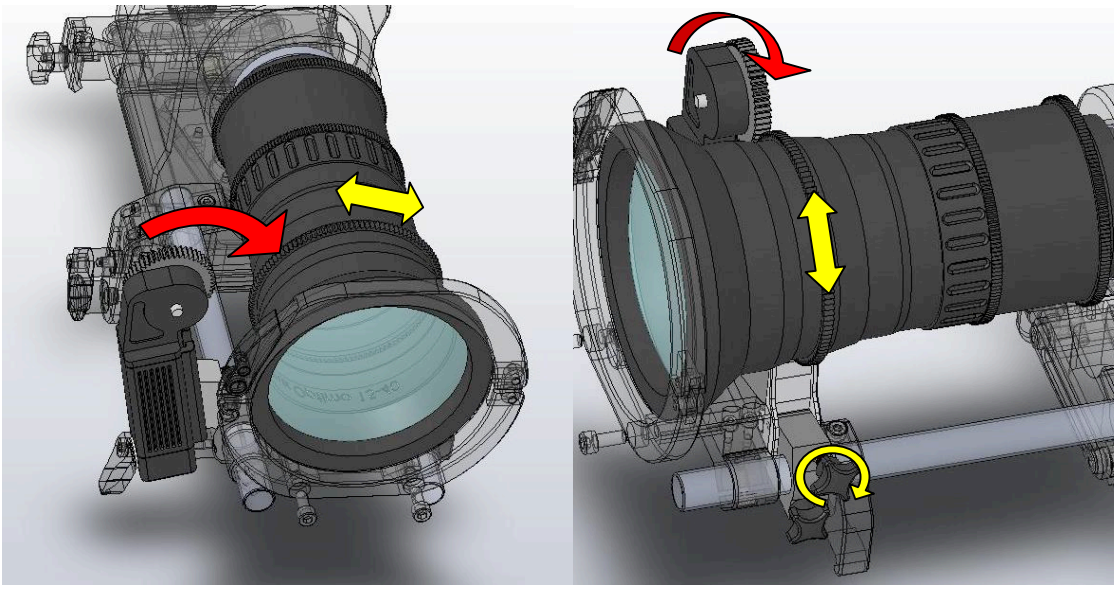


Figure 21. Engaging the motor with an ABB

6. As the gears begin to make contact, rotate the lens gear back and forth with one hand while simultaneously slowly, carefully turning the upper adjustment screw toward full engagement with the other hand. You should be able to see hear and feel the gear lash of the gear engagement while it is still loose and sloppy. The gear slop condition should lessen as you tighten the engagement of the gears with the adjustment screw. You should stop the adjustment just as all gear slop or backlash is removed**. No tighter! Warning! Over-tightening will result in the undesirable condition of binding. This binding condition can cause rough uneven movement or even full stop of the motor as well as excessive wear on the lens cams, lens bearings, lens motor bearings and lens motor overheating! If you suspect such a situation has occurred, back off the motor and try again. It's easy.**
7. Repeat the procedure for all lens motors.

4.3 Mounting Camera Lens Sled to 3FLEX TS-2-Studio 3D Camera Platform

1. Loosen 3 – Camera/Lens Sled Locks (3 – rotating KIPP handle knobs (#11))

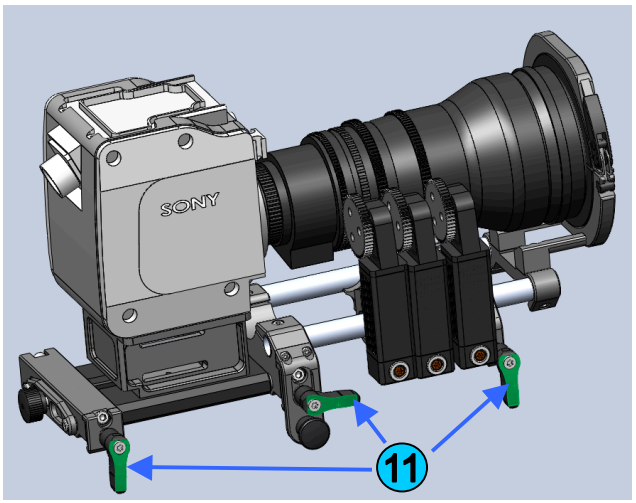


Figure 22. KIPP handle knobs

2. From back to front carefully slide the Camera/Lens Sled onto the Height/Pitch (H/P) Unit dove tail base. Carefully hold open the spring loaded safety lock knob (#12) while sliding on.

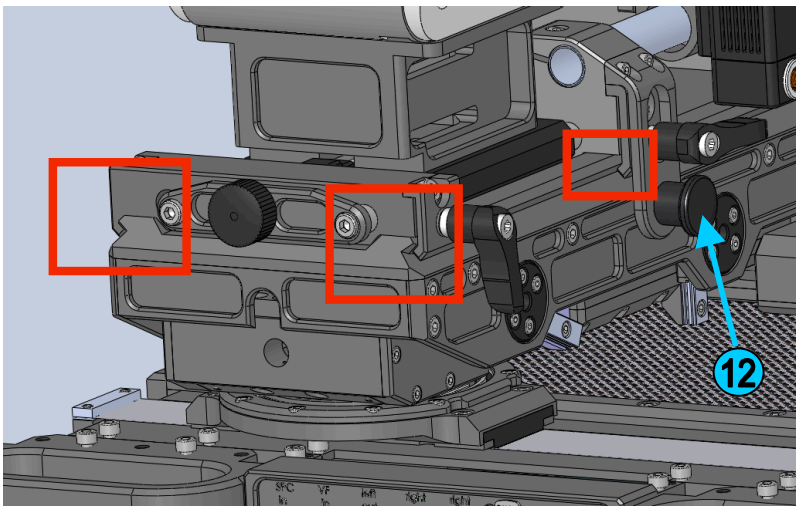


Figure 23. Height/Pitch Unit dove tails

3. All **3** – KIPP handle locks need to fit onto the dove tail base.

4. Carefully push the front of the H/P unit to the left and the back of the H/P unit to the right as far as mechanically possible, to achieve the biggest possible angle of the unit in respect to the platform's viewing direction.

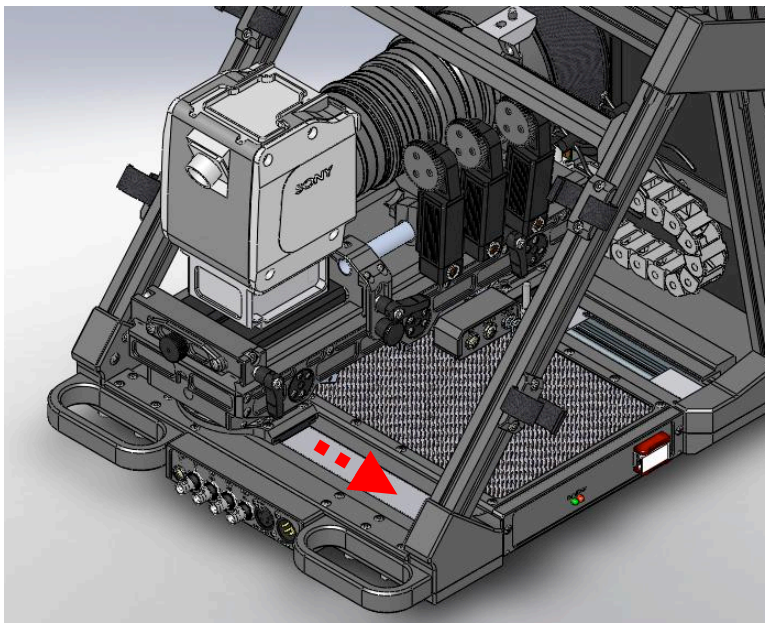


Figure 24. Manual motion of the H/P Unit

5. Slide the Camera/Lens Sled to the front of the dove tail base until contact is made with the mirror box lens opening, being sure that the Lens sock is open and not obstructing the lens. (This assures a non-binding or frictionless position is achieved)

6. Now back up the Camera/Lens Sled about **3.0 mm**. Tighten all the 3 – KIPP handle locks (#11) and connect cables for Heden lens motors and camera.

7. Close the Lens Sock around the Lens support bracket and secure with elastic lock. This Camera/Lens Sled mounting is complete.

Proceed and duplicate steps 1 to 7 for second Camera/Lens Sled on the vertical position. **PROCEED WITH CAUTION WHEN MOUNTING CAMERA VERTICALLY.**

Note that only one convergence rail needs to be moved on the vertical position to mount and achieve non binding position (Step 4).

4.4 Image Rotation Adjustment

It may be necessary to correct the image rotation of the cameras in relationship to the rig and to each other. These are non motorized, mechanical adjustments that need to be performed with simple hand tools, a video monitor, a bubble level and when possible, image analysis.

Note: 3ality Technica highly recommends the use of the 3FLEX™ SIP2XXX Stereo Image Processor.

Tools: Allen wrench (4.0 mm), video monitor, image processor (3FLEX™ SIP2XXX), small bubble level.

After cameras and lenses have been properly mounted to the TS-2-Studio sleds, use your image processor to correctly orient images. Continue to step 1.

1. Level the TS-2-Studio on a stable platform, table or camera support head using the bubble level.
2. Observe the images of the cameras on your monitor and use your judgment to determine if either camera is level to the horizon that agrees with your bubble.
3. If neither camera horizon agrees, adjust one camera horizon to the bubble reference using your judgment and the monitor. (skip to step 5)
4. If one camera horizon agrees with the bubble, then adjust the other camera to match.

   Note: If you are moving on to the second camera to match rotation between the 2 cameras, we recommend the use of an image analyzer to get pixel accurate measurements of rotational match.

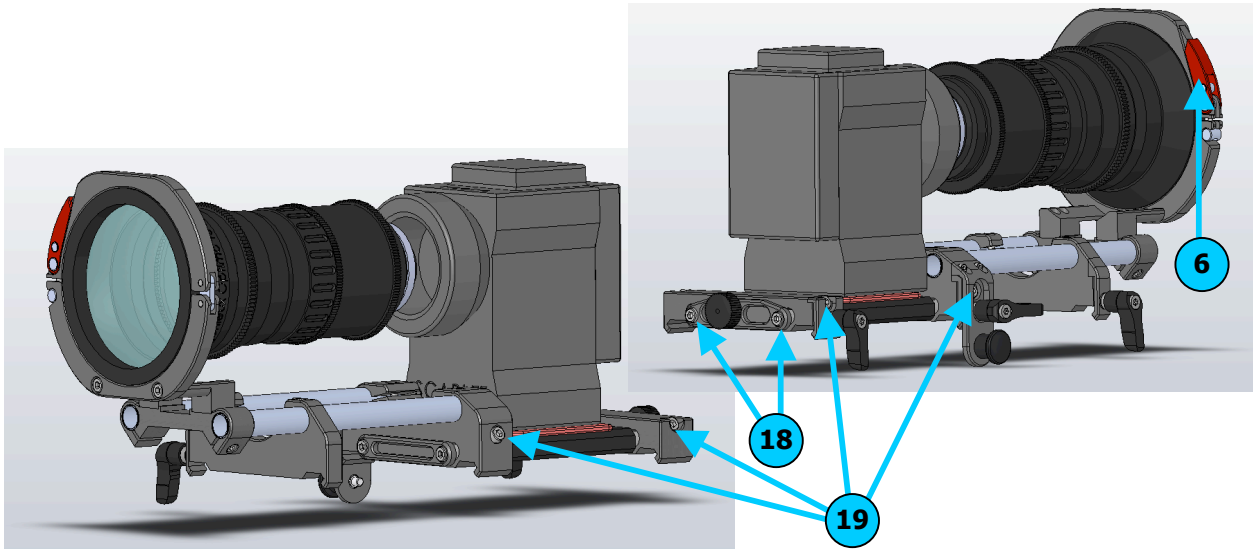


Figure 25. Details of Lens-Sled

5. Unlatch the lens bracket clamp (#6) to allow rotation of the lens within it.
6. Using the 4.0 mm Allen wrench, loosen the rotation locking clamp screws (#18) at the back of the sled unit. ½ turn at the most is all that is necessary and recommended.
7. There are 4x 4.0 mm Allen head screws for adjustment of the rotation (#19); 2x of 4.0 mm Allen screws on each side of the camera sled. Loosen 2 screws on one side of the sled by one full turn. Do not over loosen or remove the screws.
8. Tighten the 2x 4.0 mm Allen screws on the other side of the camera sled to affect rotation adjustment. (These screws are used for pulling the rotation of the sled when tightened.) The adjustment is limited by the amount you have loosened the screws on the other side.
9. When you are satisfied, retighten the 2x 4.0 mm locking clamp screws (#18) at the back of the camera sled. Do not over torque.

   Note: Please remember that you are not tightening the bolts on your car!
10. Gently re-tighten the 4x 4.0 mm adjustment screws (#19) on the camera sled, so not to change the adjustment.
11. Re-clamp the lens bracket lock #6. (repeat step 4 through 10 for second camera if necessary)
12. If you are satisfied with the rotational match between the cameras, reboot the TS-2-Studio Stereo Camera Platform.

4.5 Beamsplitter Removal

Note: Beamsplitter / Mirror removal and installation is not for the faint of heart. It requires great care and confidence. Do not hurry this process!

You may occasionally need to remove the mirror to clean the inside of the mirror box or the back side/anti-reflective side of the mirror surface. Also, while the glass is extremely durable at 6 mm thick, you might want to remove the glass prior to shipping if you anticipate very rough handling of your equipment. More often than not, however, you will be able to leave the glass in the rig mount during transport.

Tools: Soft cotton disposable gloves, safe and non-abrasive mirror holding location.

Always use soft cotton disposable gloves when handling the mirror. Never save and re-use the gloves. They may collect debris getting caught in the fibers which will scratch the surface coatings of the mirror. They will also be collecting oil and moisture that may be deposited onto the mirror surfaces.

Prepare a safe and non-abrasive location on which to place the mirror. If available, the mirror's original wooden crate is a perfect location. If the original wooden crate is not available, look for clean, dry towels or paper on a stable table surface.

1. Before beginning, ensure that the TS2 is relatively level to the earth and that the mirror's surface is free of potentially damaging debris.
2. Establish a safe and accessible location for all screws and clamps removed during this process.
3. Remove the two lower clamp safety screws #14.

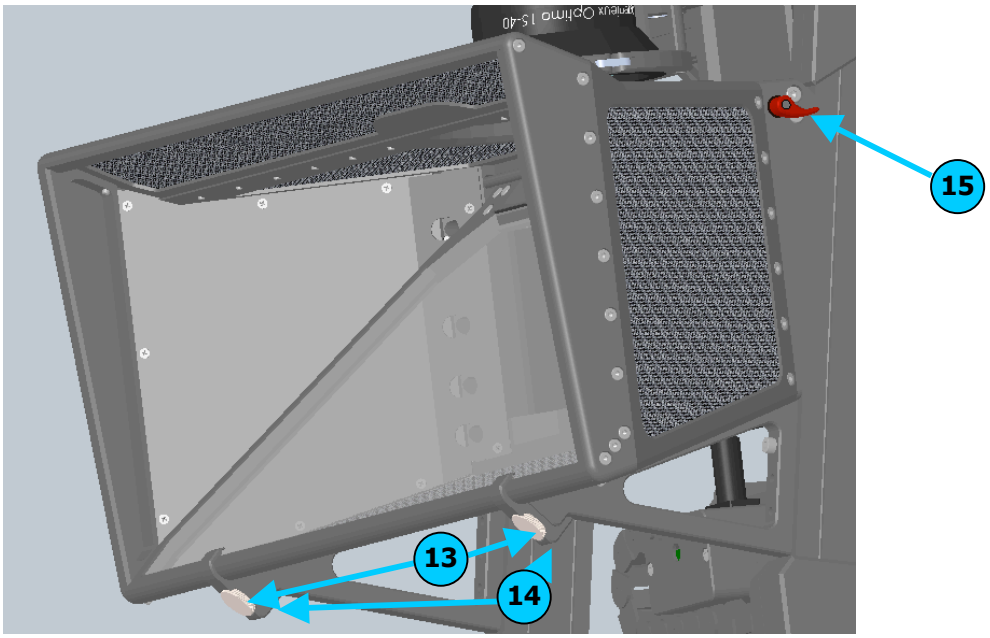


Figure 26. Outer Details of the Mirrorbox

4. Remove the 2 mirror clamps (#14) by pulling on the bottom of the clamp forward in an upward swinging motion. The mirror is still safely captured within the walls of the mirror box.
5. Wearing the cotton gloves – and being extremely carefully not to contaminate them – release the red levered upper mirror clamp (#15).
6. Insert one gloved finger from each hand into the cut out area at the bottom edge of the mirror box.
7. While applying pressure with your fingers toward the top of the mirror, lift the bottom edge of the mirror up and out of the walls of the mirror box.
8. Carefully maneuver your hands to be able to grab the mirror while continuing to apply pressure toward the top of the mirror for support until you have secured your manual hold on the mirror.
9. Slowly withdraw the mirror from the box.
10. Set the mirror down on the previously prepared safe location.

4.6 Cleaning the Beamsplitter

Note: Beamsplitter / Mirror removal and installation is not for the faint of heart. It requires great care and confidence. Do not hurry this process!

A clean beamsplitter is a prerequisite for premium quality images. There are many ways to achieve this, but here is our recommendation:

At 3ality, we prefer lens cleaners that contain Isopropyl Alcohol and not much else. Pancro lens cleaning fluid is our favorite. http://www.filmtools.com/panlencleanf.html. Also we prefer the Kimtech Kimwipes, part number 34256. www.kimtech.com. The normal lens tissues, while non abrasive, are far too small for such a large piece of glass and are not absorbent enough for such a large task.

We also recommend the use of white cotton disposable inspection gloves for the handling of the glass. However, we discourage the reuse of the gloves as they collect dirt and oil very quickly.

First use clean and dry pressurized air of some type to clear any hard deposits that might scratch the surface of the glass while wiping. When you are satisfied that any hard debris has been cleared, you may proceed to spray the glass cleaner on the mirror. The Pancro fluid is a fine mist spray. We recommend the spraying of the entire surface of the glass. Usually 3 to 4 pumps of spray should cover the glass.

Using the Kimwipes, We recommend that you crumple the large tissue into a loose ball. Always use the Kimwipes wet. Never use them completely dry, as they may still be abrasive to the coating. Wipe the surface gently with the crumpled Kimwipe until dry. Discard the used Kim wipe. Inspect the mirror for further cleaning. Start over again if needed. It may take several applications of cleaner and wipes before you are satisfied depending on amount of dirt and oil accumulated on the mirror.

The same applies to the anti reflective side of the glass. At 3ality, we clean the anti reflective side before installation. However, over time or exposure to smoke and dirty environments, you will need to remove and clean the anti reflective side again.

Tip: For determining the reflective side of the glass, use a non abrasive object (rubber eraser, cotton gloved finger, etc.) and touch the surface of the mirror. If you can touch your own reflection, it is the reflective side of the mirror. If there appears to be a gap between your object and the reflection, it is the anti-reflective side of the mirror.

Always discard the wipe after first use. NEVER reuse the Kimwipe. You will reapply the dirt to the glass.

4.7 Installing the Beamsplitter

Note: Beamsplitter / Mirror removal and installation is not for the faint of heart. It requires great care and confidence. Do not hurry this process!

Tools: Soft cotton disposable gloves, clean compressed air or photo grade canned air, sticky tape style lint roller brush.

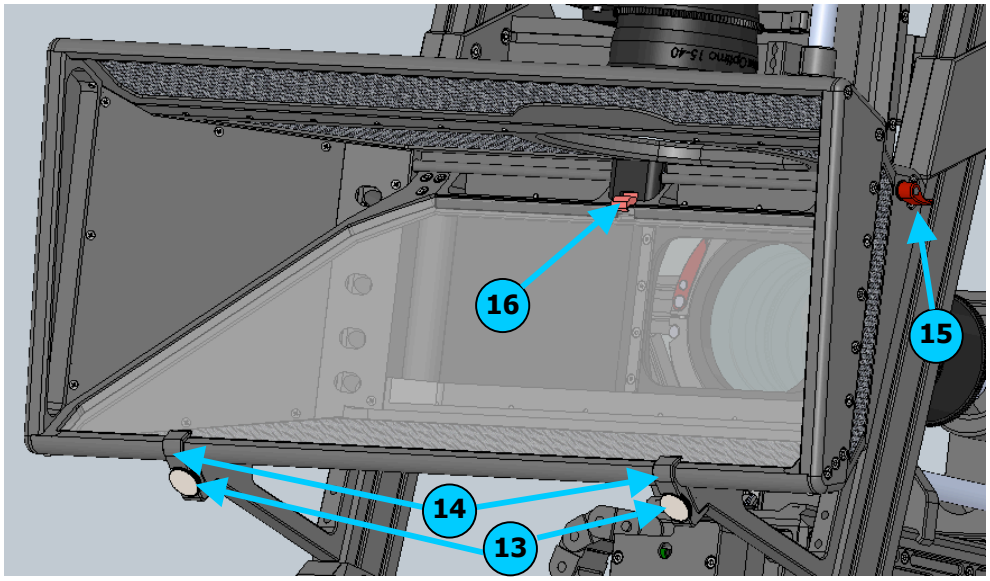


Figure 27. Inner Details of the Mirrorbox

1. The lower mirror clamps (#14) and safety screws (#13) must be removed. (keep screws and clamps safe and accessible)
2. Open the upper mechanical mirror clamp (#16) by releasing the red lever (#15).
3. Eliminate any lint and dust particles that have accumulated on the black velvet mirror box interior. Use the compressed air and lint roller tools to accomplish this.
4. Clean the inside aka the anti-reflective side of the mirror. (See previous section about cleaning the beamsplitter)

Tip: For determining the reflective side of the glass, use a non abrasive object (rubber eraser, cotton gloved finger, etc.) and touch the surface of the mirror. If you can touch your own reflection, it is the reflective side of the mirror. If there appears to be a gap between your object and the reflection, it is the anti-reflective side of the mirror.

5. Using the soft cotton gloves, hold the mirror with 2 hands, reflective side up, from the bottom or the edge of the mirror. The bottom edge is the widest edge of the trapezoid shape.
6. Carefully insert the glass into the mirror box and into the upper clamp (#16) of the mirror box frame. Be careful to not scrape the rubber tip (#17) off the upper clamp. You can dislodge and lose this piece if not careful.
7. Carefully keeping pressure against the top edge of the mirror in the top of the mirror box frame, slowly lower the bottom edge of the mirror into the lower frame. Maneuver one finger from each hand into the slots at the bottom edge of the mirror box frame so you can lower the mirror into the frame without dropping it in.
8. Once the mirror is in place, replace the lower mirror clamps (#14) first. This is done best by contacting the surface of the mirror with the rubber tip (#17) of the clamp and partially pushing the clamp into place. Next place your first finger into the open section of mirror box support structure behind the lower mirror clamp. Place your thumb on the front of the clamp and squeeze the clamp on by pinching your thumb and finger together.

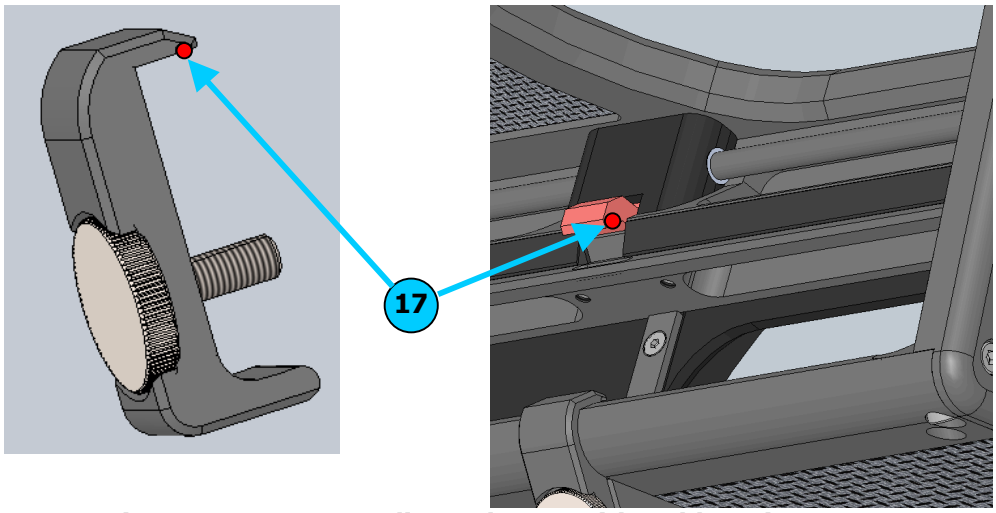


Figure 28. Beamsplitter Clamps with Rubber Tips

9. Repeat the previous step for the second lower mirror clamp (#14).
10. Close the upper mirror clamp (#16) with the red lever (#15).
11. Clean the front or reflective side of the mirror. (See previous section about cleaning the beamsplitter)

5 Specifications

5.1 Physical

Dimensions (without cameras and lenses)	L = 680 mm or 26inches W = 600 mm or 24 inches H = 720 mm or 29 inches
Frame Width	400 mm or 16 inches
Weight (without cameras and lenses)	34 kg (75 lbs)
Operating Height	< 3000 m above sea level
Operating Conditions	Temperature 0 °C to 45 °C or 32 to 113°F Rel. Humidity 20% … 80% (non condensing)
Storage Conditions	Temperature -10 °C to 55 °C or 15 to 131°F Rel. Humidity 0% … 80% (non condensing)
Power-supply	12V DC • 2 x 6Amax Used power-supplies must be compliant with the regulations in the countries used and must be current-limited to 6Amax by means of fuses, circuit-breakers or trip-switches!
Tolerance of Power-Supply	$^{+25\%}_{-10\%}$ (10.8 to 15V)
Ingress protection	IP20. Designed for indoor usage only! If used outdoors, use appropriate protection measures to prevent exposure of the device to moisture and rain!
RoHS compliance	YES
Interaxial Range	Right eye camera movement 0 to 150 mm or 6 inches
Convergence Range	Convergence each camera -1° to 3°
Currently supported Camera Types	Sony HKC-T950, Sony HKC-T1500, Sony HKC-T1500-R RED Epic, RED Scarlet, Wige CUNIMA, SI2K
Height of optical center + camera mount	96 mm
Lens Type	Max. Front Lens Diameter 114 mm
Focal Lengths	2/3” Imager 6.5 mm to + 125 mm Super 35 Imager 18 mm to + 250 mm
Height / Pitch Adjustment	Height Range ± 10.8 mm Pitch Range ± 3.8°
Rotation	Camera roll axis (turn round centerline) ± 2°
Beamsplitter Dimensions	Max. Diameter of raw glass 558 mm Glass Thickness 6 to 6.5 mm Mirror Box Width 600 mm or 24 inches
Plane Flatness	Absolute rail deviation end to end ± 0.05 mm
Positional Accuracy	Drive Accuracy 3 ☐m, Encoder Accuracy 1 ☐m
Feeback Method	Linear encoder, on fi nal stage (post gearing, etc.)
Drive Speed	Interaxial 50 mm/s or 2 inch/s
Tripod Head Mount	Multiple UNC3/8-16 female threads

5.2 Connectors and Interfaces

5.2.1 Lens-Motors

Applicable for connectors X10, X11, X12, X24, X25, X26

Lemo 7pin female receptacle assignment

Pin	Function	Direction
1	Motor M-	Output
2	Motor M+	Output
3	Encoder A	Input
4	+5VDC	Output
5	GND	-
6	Encoder B	Input
7	n.c.	-

Rear-view on TS-2-s: Female Lemo7 receptacle

Connector on TS-2-s: LEMO 7pin, female receptacle, Size 1B

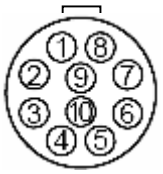
ATTENTION: Use shielded cables only!

5.2.2 SPC/SIP I/O

Applicable for connectors X1, X22. X23

Lemo 10pin female receptacle assignment

Pin	Function	Direction
1	+12VDC	Output
2	GND	-
3	TA+	Output
4	TB-	Output
5	RA+	Input
6	RB-	Input
7	n.c.	-
8	n.c.	-
9	+12VDC	Output
10	GND	-



Rear-view on TS-2-s: Female Lemo10 receptacle

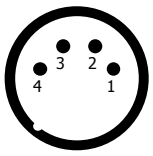
Connector on TS-2-s: LEMO 10pin, female receptacle, Size 1B

ATTENTION: Use shielded cables only!

5.2.3 Power Input

Applicable for connector X7

Voltage	12VDC $^{+25\%}_{-10\%}$ (10,8-15VDC)
XLR pin assignment	1. 0V / GND for electronics, internal motors and power-output X6 at right camera 2. 0V / GND for power-outputs X27 at left camera 3. +12V for power-outputs X27 at left camera 4. +12V for electronics, internal motors and power-output X6 at right camera
Current	2 x 6Amax, externally limited
Connector TS-2-s	NEUTRIK XLR 4pin, male
ATTENTION:	Use only power-supply or battery-pack, which is compliant with the regulations in your country and make sure, that the current of your power-supply is internally limited to 6Amax by means of fuses or circuit-breakers!



Rear view on TS-2-s:

The usage of the following Y-cable is recommended:

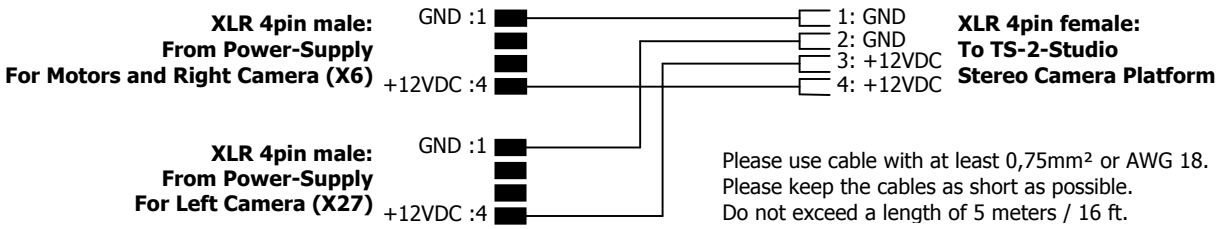
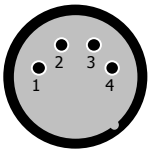


Figure 29. Recommended Y-Power Cable

5.2.4 Power Output Right Camera

Applicable for connector X6

Voltage	12VDC $^{+25\%}_{-10\%}$ (10,8-15VDC)
XLR pin assignment	1. 0V / GND 2. n.c. 3. n.c. 4. +12V
Current	4Amax
Connector TS-2-s	NEUTRIK XLR 4pin, female

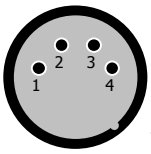


Rear view on TS-2-s:

5.2.5 Power Outputs Left Camera

Applicable for connectors X27

Voltage	12VDC $^{+25\%}_{-10\%}$ (10,8-15VDC)
XLR pin assignment	1. 0V / GND 2. n.c. 3. n.c. 4. +12V
Current	Total current for all Power-outputs (OUT1, OUT2, OUT3) together: 6Amax
Connector TS-2-s	NEUTRIK XLR 4pin, female



View on TS-2-s:

5.3 Mechanical

Attention:

- All dimensions in mm
- Dimensions are rounded
- Not to Scale
- TS-2-Studio Stereo Camera Platform is shown with an arbitrary camera and an arbitrary lens
- Design details might change without prior notice

5.3.1 Front View

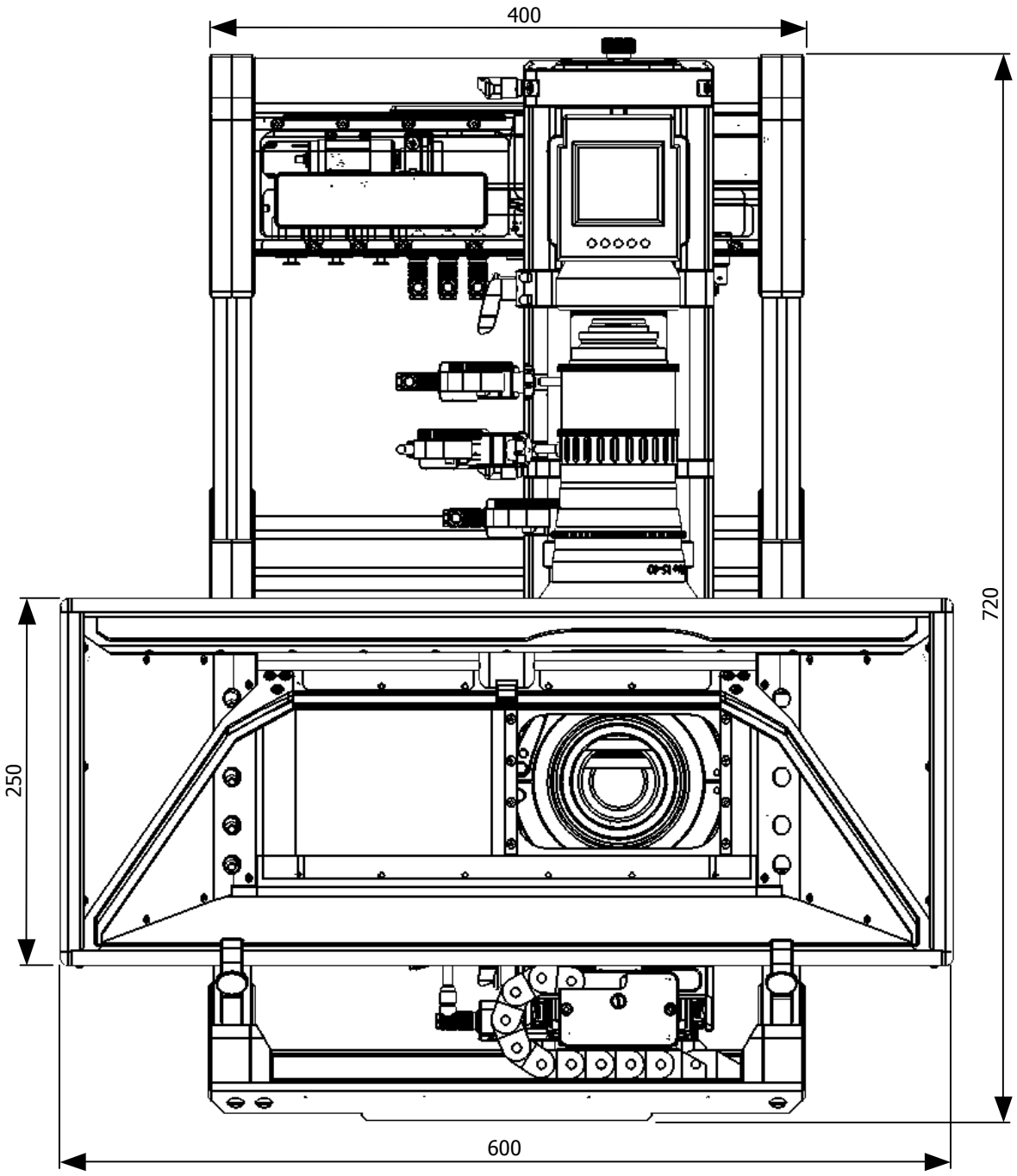


Figure 30. Front View

5.3.2 Rear View

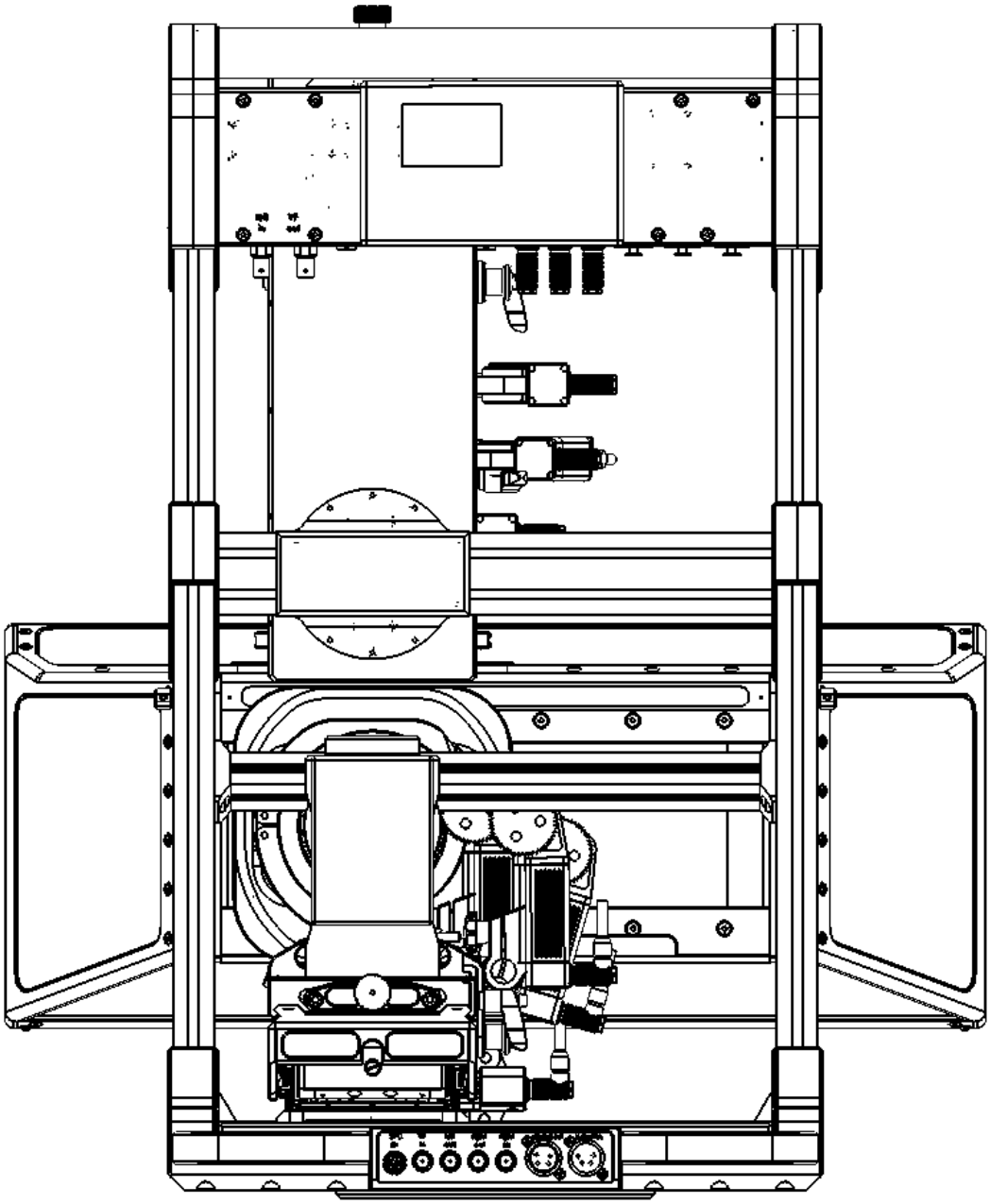


Figure 31. Rear View

5.3.3 Left Side View

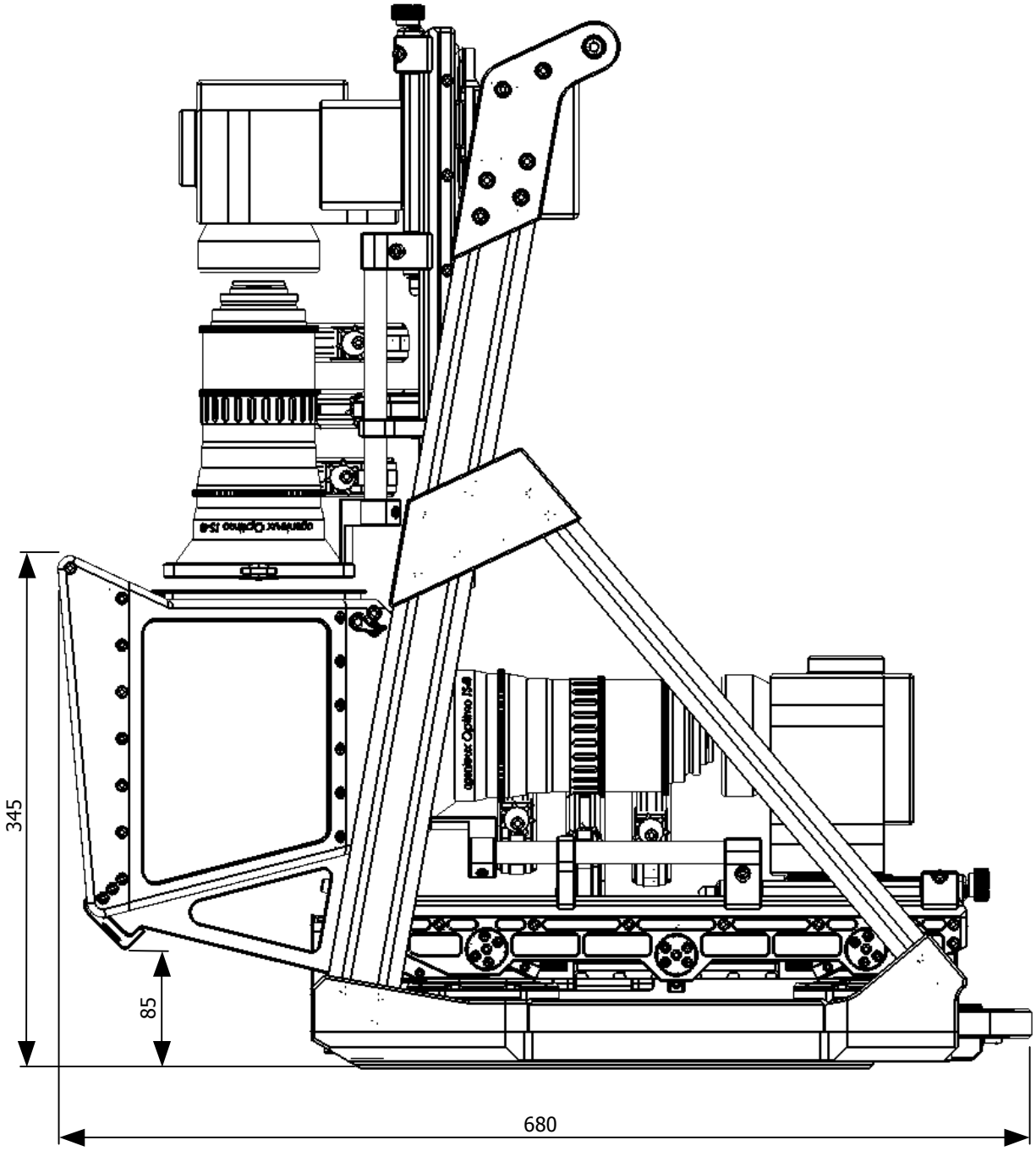


Figure 32. Left Side View

5.3.4 Right Side View

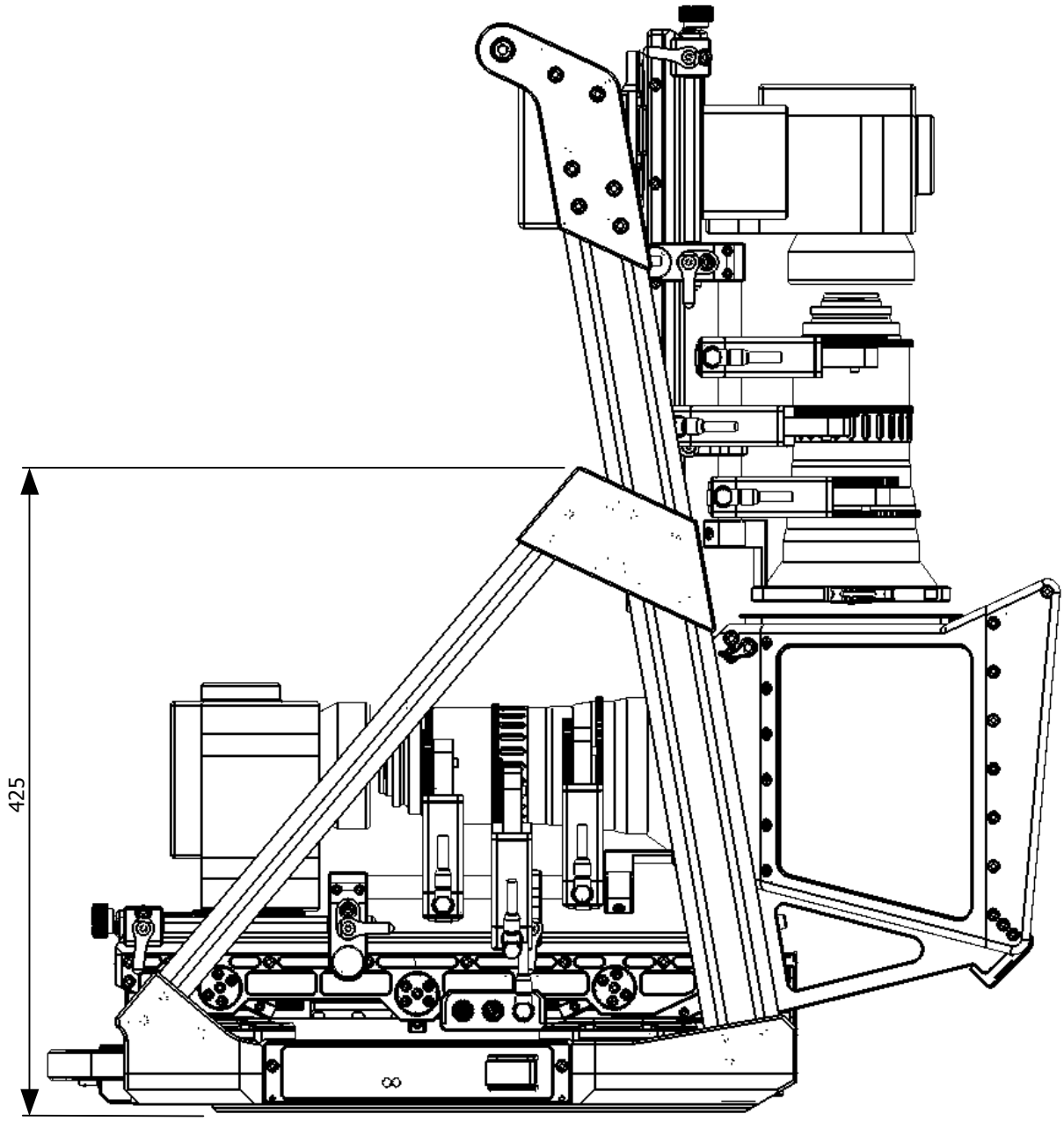


Figure 33. Right Side View

5.3.5 Top View

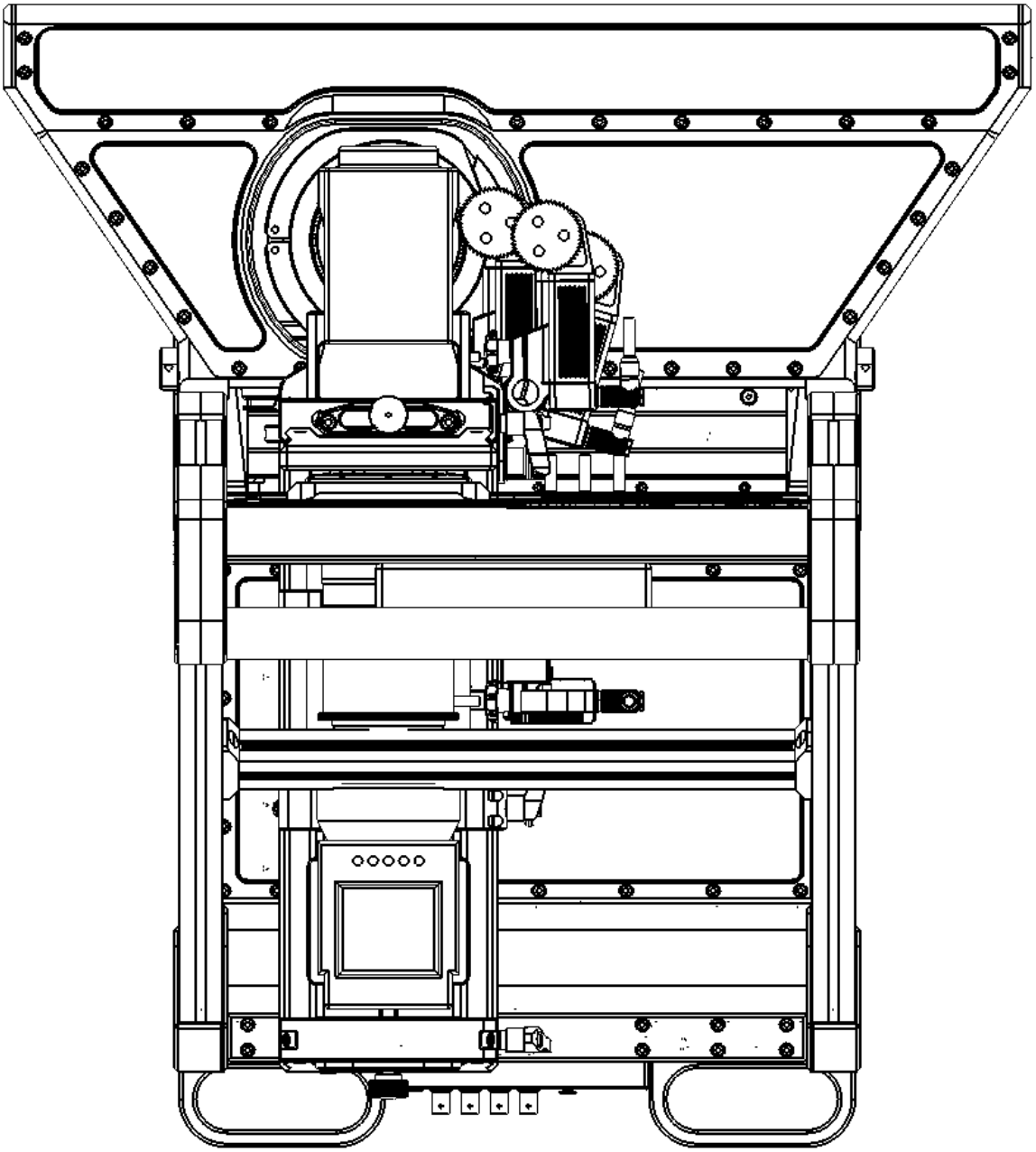


Figure 34. Top View

5.3.6 Bottom View

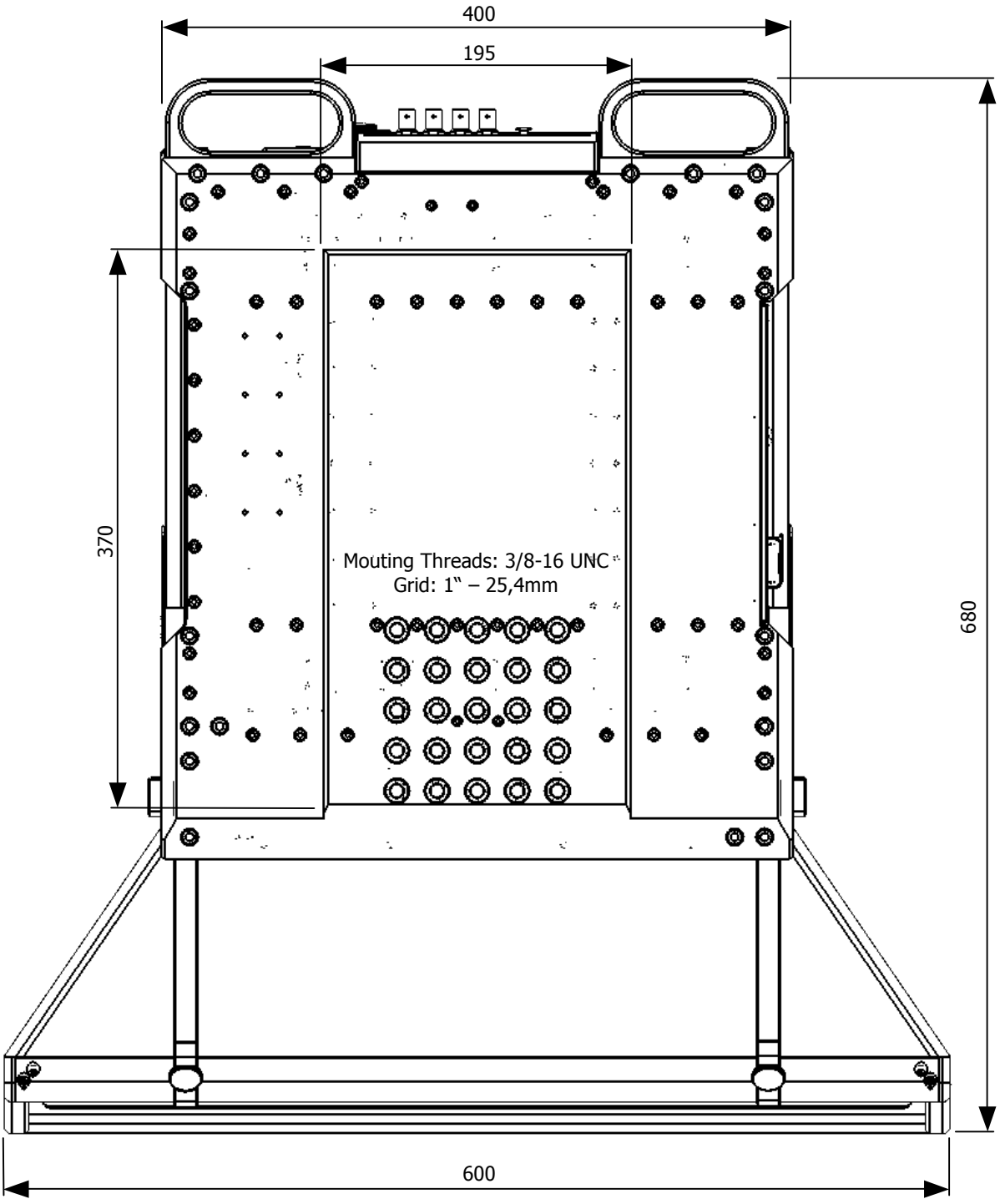


Figure 35. Bottom View

6 Appendix

6.1 Declarations of Conformity

6.1.1 CE

CE

DECLARATION OF CONFORMITY

This declaration is valid for following product:

Equipment: **Stereo Camera Platform**

Type: **3FLEX™ TS-2-Studio**

Hereby the equipment is confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Laws of the Member States relating to Electromagnetic Compatibility (2004/108/EEC).

The following company is responsible for this declaration:

3ality Digital Systems LLC.
55 E. Orange Grove Ave
Burbank, CA 91502
United States of America

Authorized Representative in the EC:
3ality Digital Systems GmbH
Gut Mergenthau
D-86438 Kissing
Bavaria / Germany / Europe

The measurements were carried out in accredited laboratories.

For the evaluation of above mentioned Council Directives for Electromagnetic Compatibility and for Low Voltage following standards were consulted:

- EN 61000-6-2:2005 – General Standards: Immunity for Industrial Environments
- EN 61000-6-3:2007 – General Standards: Emission standards for residential, commercial and light-industrial environments

Kissing / March 15th, 2010
Place / Date

ppa. Th. Ebhardt
Signature of responsible Person

Figure 36. CE Declaration of Conformity

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